Test Number: 2589

MA 15800 Exam 2 Fall 2024

Student Name: _____ Section Number: _____

1. Fill out your name and section number in the space provided above. On the scantron, fill in your name, section number (see table below), test number (see above), and your student ID number (with two leading zeros). Sign your name.
2. You can write in this exam booklet. Turn in both your scantron and your exam booklet when you are done. Note: you will be graded only based on your scantron answer sheet.
3. Only a TI-30Xa scientific calculator is allowed. No other electronic devices are allowed. No books or notes are allowed.
4. The exam questions are self-explanatory. Please do not ask the proctor to explain or interpret any of the exam questions.
5. There are 15 questions. You will have 60 minutes to complete the exam. Good luck!

Section	Time	Instructor		Section	Time	Instructor
101	1:30	Cian Nolan		109	12:30	Jax Mader
102	12:30	Cian Nolan		110	11:30	Jax Mader
103	8:30	Martin Hsu		500	11:30	Jakayla Robbins
104	7:30	Martin Hsu		600	10:30	Susitha Karunaratne
105	12:30	Conner Partaker		700	7:30	Tim Delworth
106	11:30	Conner Partaker		800	8:30	Jill Shalabi
107	1:30	Zijin Liu		Y01*	Distance Learning	Jill Shalabi
108	12:30	Zijin Liu		*Students in section Y01 should enter 999 as the section number on the scantron		

Factoring Formulas

$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

Sphere

$V = \frac{4}{3}\pi r^3$ $S = 4\pi r^2$

Compound Interest

$A = P\left(1 + \frac{r}{n}\right)^{nt}$ $A = Pe^{rt}$

Closed Right Circular Cylinder

$V = \pi r^2 h$ $S = 2\pi rh + 2\pi r^2$

Closed Right Circular Cone

$V = \frac{1}{3}\pi r^2 h$ $S = \pi r\sqrt{r^2 + h^2} + \pi r^2$

Pythagorean Identity

$sin^2\theta + cos^2\theta = 1$

Problem 1

(6.67 points)

Find the zero(s) of the function $f(x) = 13\,(x-1)(x+6)\left(x^2+4\right)$.

1. (A) $x = -6,\, x = 1$

   (B) There are no zeros.

   (C) $x = -6,\, x = -2,\, x = 1,\, x = 2$

   (D) $x = -2,\, x = -1,\, x = 2,\, x = 6$

   (E) $x = -6,\, x = 1,\, x = 13$

   (F) $x = -312$

Problem 2

(6.67 points)

Find an equation for a polynomial function with the following properties:

1. degree 3
2. a root of multiplicity 2 at $x = -8$ and a root of multiplicity 1 at $x = 2$
3. $f(3) = 11$

2. (A) $f(x) = \dfrac{11}{125}\,(x+2)(x-8)^2$

   (B) $f(x) = \dfrac{1}{1083}\,(x-2)(x+8)^2$

   (C) $f(x) = (x-2)(x+8)^2$

   (D) $f(x) = \dfrac{1}{11}\,(x-2)(x+8)^2$

   (E) $f(x) = (x-2)\left(x^2+8\right)$

   (F) $f(x) = (x+2)(x-8)^2$

Problem 3

(6.67 points)

Rewrite the given quadratic function in standard form: $f(x) = 2x^2 + 8x - 21$

3. (A) $y = 2(x+2)^2 - 13$

   (B) $y = 2(x+2)^2 - 21$

   (C) $y = 2(x+2)^2 - 29$

   (D) $y = x\left(x - \frac{21}{2}\right)^2$

   (E) $y = 2(x+2)^2 - 25$

   (F) $y = 2x(x+8)^2 - 21$

Problem 4

(6.67 points)

Find the vertical asymptote(s) of the function $f(x) = \dfrac{x^2 - 2x - 35}{3x^2 + 3x + 60}$.

4. (A) $x = 4$

   (B) $x = -5$ and $x = 7$

   (C) $x = -5$ and $x = 4$

   (D) There are no vertical asymptotes.

   (E) $x = 0$

   (F) $x = -5$

Problem 5

(6.67 points)

Find the y-intercept(s) of the function $f(x) = 7\,(x-4)(x+2)^2$.

5. (A) $y = 7$

   (B) $y = -112$

   (C) $y = -2$, $y = 4$, and $y = 7$

   (D) $y = 0$

   (E) There are no y-intercepts.

   (F) $y = -56$

Problem 6

(6.67 points)

If $\$5500$ is invested in an account with an interest rate of 4.2% compounded continuously, determine the balance in the account after 10 years.

6. (A) $\$2870.79$

   (B) $\$7350.35$

   (C) $\$3613.76$

   (D) $\$6326.51$

   (E) $\$9921.94$

   (F) $\$8370.79$

Problem 7

(6.67 points)

Find the range of the inverse function $f^{-1}(x)$ given $f(x) = \sqrt{5-x}$.

7. (A) $[0,\infty)$

   (B) $\left(-\infty,-\sqrt{5}\right) \cup \left(\sqrt{5},\infty\right)$

   (C) $(-\infty,0]$

   (D) $(-\infty,\infty)$

   (E) $[5,\infty)$

   (F) $(-\infty,5]$

Problem 8

(6.67 points)

Find the x −intercepts of the graph of the function $f(x) = \dfrac{x^2-3x-10}{x^2+10x+16}$.

8. (A) $x = 5,\ x = -8$

   (B) $x = -\dfrac{5}{8}$

   (C) $x = -2,\ x = -8$

   (D) There are no x −intercepts.

   (E) $x = -2,\ x = 5$

   (F) $x = 5$

Problem 9

(6.67 points)

At a selling price of p dollars, a company can sell $Q = 150 - 8p$ widgets each day. At what price p should the company sell its widgets to maximize daily revenue? Round to the nearest cent.

9. (A) \$18.75

(B) \$9.38

(C) \$150.00

(D) \$46.88

(E) \$37.50

(F) \$6.25

Problem 10

(6.67 points)

Find the slant asymptote of the graph of the rational function $f(x) = \dfrac{2x^2 + 4x + 21}{x - 9}$.

10. (A) $y = x - 9$

(B) $y = 2x + 21$

(C) $y = 2x - 14$

(D) $y = 2x + 22$

(E) $y = x - 14$

(F) There is no slant asymptote.

Problem 11

(6.67 points)

Which of the following is true of the function $f(x) = \dfrac{x^2+3x-18}{x^2+12x+27}$?

11. (A) The graph of f has 2 vertical asymptotes and 1 slant asymptote.

(B) The graph of f has 1 vertical asymptote, 1 hole, and 1 horizontal asymptote.

(C) The graph of f has 2 horizontal asymptotes and 1 hole.

(D) The graph of f has 2 vertical asymptotes and 1 horizontal asymptote.

(E) The graph of f has 1 vertical asymptote and 1 slant asymptote.

(F) The graph of f has 1 vertical asymptote, 1 horizontal asymptote and no holes.

Problem 12

(6.67 points)

Find the inverse function $f^{-1}(x)$, given $f(x) = \dfrac{x+7}{x-10}$.

12. (A) $f^{-1}(x) = \dfrac{x-1}{10x+7}$

(B) $f^{-1}(x) = \dfrac{10x+7}{x-1}$

(C) $f^{-1}(x) = \dfrac{x+10}{x-7}$

(D) $f^{-1}(x) = \dfrac{x-10}{x+7}$

(E) f does not have an inverse.

(F) $f^{-1}(x) = \dfrac{x-7}{x+10}$

Problem 13

(6.67 points)

Find the standard equation of the parabola with vertex $(7,1)$ and passing through the point $(0,8)$.

13. (A) $y = \frac{1}{7}(x-1)^2 + 7$

(B) $y = (x+1)^2 + 7$

(C) $y = (x-7)^2 + 1$

(D) $y = (x-1)^2 + 7$

(E) $y = \frac{1}{7}(x-7)^2 + 1$

(F) $y = x^2 + 8$

Problem 14

(6.67 points)

Determine the end behavior of $f(x) = -4x^2(x+3)^3(x-5)^7$.

14. (A) As $x \to -\infty$, $y \to 0$ and as $x \to +\infty$, $y \to 0$.

(B) As $x \to -\infty$, $y \to -\infty$ and as $x \to +\infty$, $y \to +\infty$.

(C) As $x \to -\infty$, $y \to +\infty$ and as $x \to +\infty$, $y \to -\infty$.

(D) The end behavior cannot be determined.

(E) As $x \to -\infty$, $y \to +\infty$ and as $x \to +\infty$, $y \to +\infty$.

(F) As $x \to -\infty$, $y \to -\infty$ and as $x \to +\infty$, $y \to -\infty$.

Problem 15

(6.67 points)

Given $f(x) = 2^x + 6$, evaluate $f(3)$.

15. (A) 8

(B) $f(3)$ is not a real number.

(C) 12

(D) -1

(E) 0

(F) 14